

Remarks

The Applicant thanks the Examiner for the review of the application. This application contained ten claims (1-10), of which three (1, 6 and 9) were independent. Claim 1 is cancelled herein, without prejudice. Nine new claims (11-19) have been added, all of which are dependent. Thus, eighteen claims remain in the application (2-19, of which three (4, 6 and 9) are independent. No fee is required for total claims because the fee already paid for twenty total claims exceeds that which is due for eighteen claims. No fee is required for independent claims either, as there are only three in the application.

Claim 1 has been cancelled. Claim 4 has been amended to include all of the inherent limitations of cancelled claim 1. Claims 2 and 3 have been amended to depend from claim 4, rather than claim 1. Claims 6 (and thus claims 7 and 8, which depend therefrom) and claim 9 have been amended to include limitations on the sedimentation density of the type that had been found in claim 4. Claims 10-19 each depend from either claim 4, 6 or claim 9, and thus also include this sediment density feature.

Claims 4 and 5 have been amended to clarify the language of limits, to eliminate the formulation "or below" and "or above", in favor of "at most" and "at least," respectively to remove any potential confusion that might arise due to the presence of the word "or."

Support in the specification for the new claims is found as follows: new claim 11 (viscosity at most 20 cps)- paragraph [0053]; new claim 12 (silver powder) - paragraph [0010]; new claim 13 (ratio powder to dispersion medium) - paragraph [0052]; new claim 14 (slurry printable with a jet head) - paragraphs [0052] and [0062]; new claim 15 (continuous jet head) - paragraphs [0091] to [0096]; new claim 16 (silver powder) - paragraph [0010]; new claim 17 (ratio of metal powder

to dispersion medium) - paragraph [0052]; new claim 18 (slurry is jet printable with a jet head) - in paragraphs [0052] and [0062]; and new claim 19 (silver powder) - in paragraph [0010].

Claims 4, 6 and 9 would Not Have been Obvious under 35 USC § 103(a) over Hampden-Smith in view of Parker et al and Shimizu et al.

All of the claims that had been rejected on the basis of Hampden-Smith (HS) now depend from amended claim 4 or claim 6 or claim 9. Claims 4, 6 and 9 require that a spherical metal particle slurry in a dispersion medium, with a specific particle size (claims 4 and 6) or sphericity (claim 9), have a sediment density of at least 50%.

The Office Action asserts at ¶5 that HS does not show the sediment density of the slurry. Applicants agree, it does not. The Office Action further asserts that Parker teaches that it was known that one can only obtain maximum green density with maximum sediment density, which results in a correspondingly dense cast slip having optimum packing of particles. The Office Action further asserts that Parker teaches that to obtain optimum packing one must use particles with as narrow a size distribution as possible, allow them to settle slowly out of suspension and to do so without agglomeration with the help of a dispersant, col. 1, lines 29-37. Parker does teach these details, but speaks only to ceramic particle slurries, not metal particle slurries, such as are claimed in the application.

The Office Action draws an unwarranted conclusion when it states that

it would have been obvious ... that in order to obtain a dense cast slip, a high sediment density of the metal slurry taught by Hampden-Smith must be obtained. Since the silver containing powder taught by Hampden-Smith is already narrow in size distribution and the dispersant is taught to improve dispersibility, determination of an optimum or preferred amount of sediment density of the metal slurry thereby obtaining desired denseness is within the skill of artisan, absent unexpected result.

First, the applicants note that no mention in the explanation has been made of Shimizu, so, Presumably it was cited against claim 4 in error. Thus, Shimizu is not discussed here.

Second, the argument misstates the legal standard, which is that an invention is patentable, unless, the claimed invention as a whole would have been obvious at the time the invention was made. The Office Action's argument states, "is within the skill of artisan," which erroneously casts the time of inquiry to the present date, after review of the application, rather than back to before the invention was made, when there would have been no possibility of using the applicants own disclosure as a teaching reference.

Third, the present claims, and also HS, are directed to a slurry that contains metal particles, that can be used as an electrode. But Parker is directed toward a ceramic slurry, which slurry will be used to form a green ceramic part that is sintered, but that can not be used as an electrode, because, as a ceramic, it is not sufficiently conductive of electricity. Thus, the teachings of Parker are irrelevant to the claims made here.

Parker also fails to meet the limitation for which it is cited, namely a sedimentation density of at least 50%. In Table 1, in column 9, it mentions sediment density only between 18 and 47%. This then, could only possibly stand for suggesting sedimentation density of at most 50%, which, in some sense, is the exact opposite of what is claimed.

Parker also states, in general, that to obtain maximum green density, one must use maximum sediment density. But "maximum" is an extremely vague term, which can be understood only in the context of the setting in which it is used. A maximum might be 100% in one setting, but only 20% in another. It is not the same as "at least 50%," and, in fact is totally different from that. "At least 50%" indicates that anything between 50% and 100% would be acceptable, whereas "maximum" depends on some outside criteria for evaluation. Apparently, in the context of Parker, "maximum," means between 18 and 47%, which is less than, not at least.

Even more important, Parker discusses preventing agglomeration in ceramic particles by using a dispersant to generate repulsion between adjacent particles by a mechanism of charge stabilization. But, as the present application states, in par. [0004], "[i]n contrast to ceramic particles and polymer particles, however, the metal particles have relatively small surface charges so that Hamaker constant is large. Accordingly, with decreasing particle size the particles tend more easily to coagulate" (Emphasis added.) Thus, the very feature that Parker mentions to prevent agglomeration, namely

surface charge, is different between ceramic and metal particles.

Moreover, the goal of the present invention is not simply to obtain a desired density of a printed electrode part. That is necessary, but not sufficient. All of the factors must combine to provide a metal containing slurry, which slurry will be dispersible, capable of forming an electrically conductive electrode of the required density, while using spherical particles of the specified range, .1 to 2.0 $\mu\text{m.}$, which are not extremely small (larger than nanometer particles), yet are small enough to achieve a desired sediment density. All of these features must be present, not just one or some.

Nothing in either HS or Parker suggests that some information that is relevant to ceramic powder slurries may be used in connection with metal particle slurries, or, specifically, that a suitable sediment density for some purposes in connection with ceramic particle slurry would be useful for different purposes for metal particle slurries.

Further, as mentioned in the specification of the present application, at par. [0004],

[i]n order to stably disperse metal particles in a slurry, it is necessary to make the metal particles sediment as slowly as possible. For that purpose, it is useful to make the metal particles small in size. In contrast to ceramic particles and polymer particles, however, the metal particles have relatively small surface charges so that Hamaker constant is large. Accordingly, with decreasing particle size the particles tend more easily to coagulate, and with developing coagulation the sedimentation tends to proceed. In other words, there is a problem that a slurry containing small-sized metal particles is low in dispersion property. (Emphasis added.)

Thus, the specification hereof points to one teaching from the field of ceramic particle slurries that does not carry over, does not teach a similar point, with regard to metal particle slurries. That point is that with ceramic particles, smaller is better for purposes of stable dispersion. But, for metal particles, smaller is not better, for the reason explained. Thus, there is no reason that is shown in the references to conclude that other properties of ceramic particle slurries would obviously obtain with respect to metal particle slurries, even if those properties were what is claimed, which they are not.

Further, as explained above, Parker does not even teach the sediment density claimed of at least 50%, but merely indicates that for some purposes it is desirable to have the sediment density be maximum.

Several other claims mention that the slurry have an additional property, of being jet printable. These are claims 14, 15 and 18. A combination including this feature along with the others claimed in the base claims is certainly not shown, taught or suggested in HS or Parker alone, or in combination.

The Office Action has stated that achievement of an optimum amount of sediment density does not confer patentability, absent unexpected results. This misstates the standard of patentability. The standard is whether the claimed invention on the whole, taken all together, would have been obvious. In this case, the combination of features results in a metal particle slurry that can be printed through a jet head, into a form that can be used for an electrode. That combination of features would simply not have been obvious from the cited references, without the present application to use as a template into which to fit the disparate teachings of the references. Such use of the references and the applicants' own disclosure is improper.


Thus, it is respectfully requested that the rejections be reconsidered and withdrawn, in light of the amendments herein.

Applicant points out that although the words of claims 4 are being amended to include all of the limitations of the base claim 1, these amendments to claim 4 are not made for purposes of patentability, or to avoid prior art cited against claim 4, or narrowing amendments, or substantive amendments of any kind. In its dependent form, all of the limitations of the base claim 1 were implicit in claim 4. This amendment to claim 4 merely makes them explicit. It is an amendment merely of form, not substance. Thus, the amendment in no way is to be interpreted as applicant's surrendering any patent estate territory relative to possible future assertion of the doctrine of equivalents, as discussed by the Supreme Court in Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 122 S.Ct. 1831 (2002).

Applicant is of the opinion that the claims of the present application patentably distinguish over this art or any combination thereof.

The Commissioner is hereby authorized to charge payment of any additional fees associated with this communication or credit any overpayment to Deposit Account No. 23-0833, in the name of the undersigned.

Respectfully submitted,


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Blue Mac Storage:Gibralter Clients:Clients:MIT:MIT 3DP All:TDK Temporary:MIT 10282 Metal
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